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The hard parts, exoskeletons, of crustacea contain varying intermixtures of calcite and phosphate of lime.

The bryozoans have cases composed of a mixture of calcite and aragonite.

The brachiopoda have shells composed of calcite and some phosphate of lime, the latter salt being almost limited to the shells of the inarticulate division of this class—*lingula cranio discina*, etc.

In the lamellibranchs there is found some variation in the composition of shells of different genera, in some the shells are wholly aragonite, in oysters and scollops (*Ostrea*, *Pecten*) the shells are calcite, whereas in mussels *Mytilus* and *Pinnas*, the outer layer is calcite, the inner aragonite.

SOME MANITOBA CLADOCERA, WITH DESCRIPTION OF ONE NEW SPECIES.¹

By L. S. Ross.

No record is to be found among the literature upon Entomostraca, of any systematic work done upon this interesting division of the Crustacea in Manitoba or any of the Provinces of Canada. The region is yet open to the student of the distribution of the group. A short stay in the Province of Manitoba in June, 1895 was utilized by the author in making a few collections from the region about Portage la Prairie on the Canadian Pacific Rail Road fifty-five miles west of Winnipeg. Before leaving the province some vials of alcohol were left with a resident of the town to be filled with collections. A vial was received every second week from the time of the visit until cold weather, the latest being filled Oct. 21, 1895. One vial remained to be filled the following spring.

Collections were taken by the author from the Assiniboin River, from a deep weedy slough which was once the channel of the Assiniboin River, from railroad ditches and from prairie

¹ Read before the Iowa Academy of Sciences, Dec. 1876.

pools and ponds. A hurried visit to Lake Manitoba gave opportunity for a few hauls of the net among the rushes along the shore.

An examination of the material obtained shows the presence of thirty species and varieties, one of which, and possibly two, is a new addition to the list of described species.

The forms belong to the following families:

Sididæ	1
Daphniidæ . . .	9
Bosminidæ . . .	1
Macrotrichiidæ .	4
Lynceidæ . . .	13
Polyphemidæ . .	1
Leptodoridae . .	1
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	30

The distribution of the species is given in the following table:

ASSINIBOIN RIVER.

Daphnia pulex DeGeer.

Ceriodaphnia consors (?) Birge.

Iliocryptus sp.?

Chydorous sphaericus O. F. Müller.

Graptoleberis testudinaria var. *inermis* Birge.

RAT CREEK AT McDONNELL ON PORTAGE PLAINS.

Daphnia pulex DeGeer.

Ceriodaphnia consors (?) Birge.

Simocephalus vetulus O. F. Müller.

Simocephalus serrulatus Koch.

Scapholeberis angulata Herrick.

Scapholeberis mucronata O. F. Müller.

Eurycercus lamellatus O. F. Müller.

Alona costata Sars.

Graptoleberis testudinaria var. *inermis* Birge.

Pleuroxus procurvus Birge.

Pleuroxus excisus Fischer.

Pleuroxus sp?

Chydorus sphæricus O. F. Müller.
Acroperus leucocephalus Koch.
Polyphemus pediculus Linnæus.

PRAIRIE SLOUGH NEAR PORTAGE LA PRAIRIE.

Daphnia pulex var. *pulicaria* Forbes.
Ceriodaphnia consors (?) Birge.
Simocephalus vetulus O. F. Müller.
Simocephalus serrulatus Koch.
Scapholeberis mucronata O. F. Müller.
Lathonura rectirostris O. F. Müller.
Macrothrix laticornis Jurine.
Bunops scutifrons Birge.
Eurycercus lamellatus O. F. Müller.
Graptoleberis testudinaria var. *inermis* Birge.
Dunhevedia setiger Birge.
Pleuroxus denticulatus Birge.
Pleuroxus procurvus Birge.
Pleuroxus sp.?
Chydorus globosus Baird.
Chydorus sphæricus O. F. Müller.
Alonopsis latissima var. *media* Birge.
Acroperus leucocephalus Koch.
Polyphemus pediculus Linnæus.

DEEP WEEDY SLOUGH AT PORTAGE LA PRAIRIE.

Sida crystallina P. E. Müller.
Daphnia pulex DeGeer.
Ceriodaphnia consors (?) Birge.
Ceriodaphnia reticulata Jurine.
Ceriodaphnia acanthinus n. sp.
Simocephalus vetulus O. F. Müller.
Scapholeberis mucronata O. F. Müller.
Lathonura rectirostris O. F. Müller.
Bosmina longirostris O. F. Müller.
Eurycercus lamellatus O. F. Müller.
Alona quadrangularis O. F. Müller.
Pleuroxus denticulatus Birge.

Pleuroxus procurvus Birge.

Chydorus sphæricus O. F. Müller.

Camptocercus rectirostris Schœdler.

Polyphemus pediculus Linnæus.

LAKE MANITOBA.

Bosmina longirostris O. F. Müller.

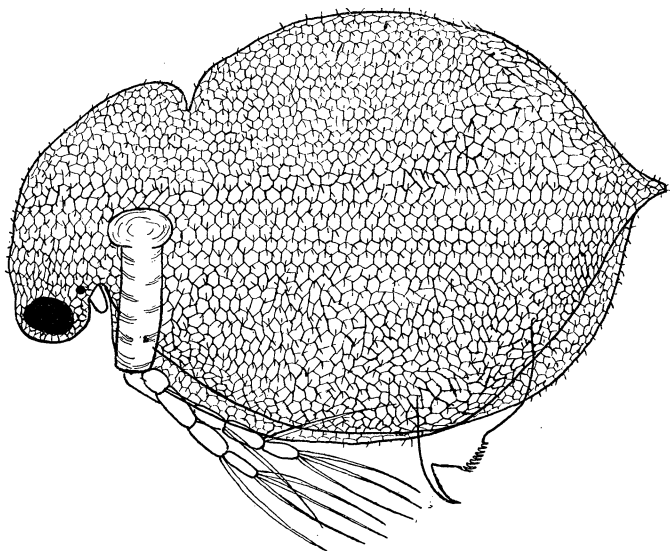
Chydorus sphæricus O. F. Müller.

Leptodora hyalina Lilljeborg.

DESCRIPTION OF A NEW SPECIES.

CERIODAPHNIA ACANTHINA.

The body is large, rounded, with the valves of the shell forming a well developed posterior spine. The head is separated from the body by a very deep depression. Head is low,



Ceriodaphnia acanthina ♀

small, rounded in front of the eye, sinuous above and angled between the eye and the antennules; the lower margin is nearly in a line with the lower margin of the valves of the shell.

The shell is very strongly reticulated with small very sharply marked hexagonal reticulations measuring about .016 to .021 mm. across. Small sharp spines project from the angles of the reticulations, many at nearly right angles with the surface of the shell. In the possession of these spines this species closely resembles *C. setosa* Matile. No spines were seen on the rounded front of the head as are usually present in *C. lacustris* Birge. The dorsal margin of the shell is arched, curving gradually into the posterior margin.

The posterior spine of the shell may be near the dorsal margin, or one-third the distance from the dorsal to the ventral margin. When the spine is situated low the posterior shell margin above is slightly concave. The spine is as well developed as in *C. lacustris* Birge, and often ends in blunt teeth, but is not divided into two parts at the end as is sometimes the case in that species. The posterior margin of the shell curves gradually into the strongly convex ventral margin. The fornicies are greatly developed extending almost the width of the shell. They are almost as broad but are not so sharply angled as in *C. lacustris* and do not end in sharp teeth.

The antennules are short and thick, reaching to or a very little beyond the angle behind the eye. Setæ are present toward the distal end. The antennæ are long and rather slender; the setæ reach nearly to the posterior margin of the shell.

The post abdomen is of moderate size slightly tapering toward the end and is armed with nine to eleven strong recurved spines of nearly equal size except the first and last which are smaller. The anal claws are, long, curved, and denticulate on the inner side with minute teeth of two sizes. The teeth of the basal two fifths of the claw, some forty or fifty in number, are two or more times longer than those of the distal portions.

The eye is of moderate size, situated near the margin of the head or back a short distance from the margin. The lenses do not project far from the eye pigment. The pigment fleck is small, rounded, and situated back of the lower portion of the eye at a distance approximating half the diameter of the eye.

In general shape the species resembles *C. rotunda* Straus. The posterior spine is not as near the dorsal margin as Kurtz

figures it in *C. rotunda*, but is in nearly the same position as in a specimen examined of that species identified by G. O. Sars of Norway. The reticulations are as distinct and the double contoured markings (due merely to depth of reticulated areas) mentioned by Herrick and used in his key, are fully as prominent as in *C. rotunda*.

The reticulations and the minute spines on the surface of the shell are very like those described and figured by Matile in *C. setosa*. The measurements of *C. setosa* are but little over half those of *C. acanthinus*. Matile's description of *C. setosa* gives the length .42 to .54 mm. and the height .27 to .36 mm. while *C. acanthinus* measures from .80 to 1 mm. in length, and .70 to .77 mm. in height. The head of *C. acanthinus* is larger and extends nearer to a level with the ventral margin of the shell. Some specimens of *C. reticulata* taken from the same slough at the same time have the reticulations nearly as distinct as in *C. acanthinus* and also possess minute spines upon the surface of the shell. The two species are distinct, however, because of differences in the shape of the body, and of the difference in the armature of the anal claws.

The males were not seen. The mature females measure from .80 to 1. mm. long and .70-.77 mm. high. Found in abundance in a weedy slough in late May, 1896 at Portage la Prairie.

NOTES ON SOME OF THE SPECIES.

Sida crystallina: Was taken only from a deep weedy slough at Portage la Prairie.

Ceriodaphnia reticulata: Was in a bottle sent in May, 1896 from the slough at Portage la Prairie. The specimens have the reticulations very sharply marked. Some show numerous short spines at the angles of the reticulations. The number of spines on the anal claw varies somewhat. This species was found with *C. acanthinus*. It differs from the typical *C. reticulata* in the distinctness of the reticulations and in the presence of spines on the shell in some individuals.

Ceriodaphnia consors: Numerous specimens were found at various places which are with much hesitation referred to this species.

Scapholeberis angulata : Was taken only in small numbers, a few being found in Rat Creek on Portage Plains.

Daphnia pulex var. *pulicaria* : Was found in small numbers in a prairie slough near Portage la Prairie.

Simocephalus daphnoides (?) The body is robust, with greatest height a little behind the middle. The head is rounded in front and has no spines. Lower margin of the head is slightly concave, straight, or even slightly convex to the base of the short beak which may project at nearly a right angle to the lower margin of the head. The head is separated from the body by only a very slight depression. Depth of the head in one specimen is .077 mm.; length from the posterior margin of the base of the antennæ .052 mm. The head has a daphnia-like appearance. The ventral margin of the shell has few very short blunt teeth. The posterior margin from short blunt posterior spine toward dorsal margin has teeth better developed than those on the ventral margin. The dorsal margin teeth continue forward a short distance. The posterior spine is very short, blunt, armed with short teeth and is situated little above the middle of the posterior margin.

The eye is of moderate size, situated near the front of the head or at a short distance from the front, and at a distance from the lower margin equalling one-half the diameter of eye, or at a distance slightly greater than diameter. Pigment fleck is irregular in shape; elongated, rhomboidal and oval forms were seen. Pigment fleck is small, situated near the posterior margin of the head.

Specimens measured vary in length from 2.04 mm. to 2.53 mm.: in depth from 1.20 mm. to 2.04 mm.

The description of *S. daphnoides* as given by Herrick in AMERICAN NATURALIST, May, 1883, and in Entomostraca of Minnesota, is rather brief. Herrick states that the form is found only south of the Tennessee River; but a comparison of specimens taken in Manitoba with the original drawings and brief description in the AMERICAN NATURALIST makes it appear that the form is found even in that northern province.

Lilljeborg's "Crustaceis" published in 1853 gives drawings of *S. vetulus* with the lower margin of the head as nearly

straight as in the figures by Herrick of *S. daphnoides*, and the general outline of the body almost as daphnia-like in appearance.

Eylmann in the "Berichte der Naturforschenden Gesellschaft zu Freiburg" Zweiter Band, Drittes Heft, published in 1886, figures the lower margin of the head of *S. vetulus* straight to the short beak, and the body with greatest height at the middle. A specimen of *S. vetulus* identified by G. O. Sars, of Norway, and examined by the author has the lower margin of the head straight to the very short beak and the eye situated at a distance from the lower margin equal to about one-half the diameter of the eye.

Herrick says in his description that the curved spines present in the other species at the caudo-ventral angle of the shell are absent from *S. daphnoides*. If this be constant it seems to be the only character not possessed by specimens of *S. vetulus*.

The specimens taken in Manitoba, and also in Iowa, vary in size, and shape of the head and of the body; there are such grades of variation, and authors figure such differences of form in *S. vetulus*; that it seems very probable that *S. daphnoides* is merely an extreme form of *S. vetulus*.

Bosmia longirostris: Found in only two collections; one from Lake Manitoba and the other from a slough at Portage la Prairie.

Macrothrix laticornis: This species was met with only in a shallow prairie slough and was by no means abundant.

Bunops scutifrons: This beautiful species was found rather frequent in the shallow prairie slough at Portage la Prairie.

Iliocryptus sp.?: A few shells and one individual of this genus were taken from the Assiniboin River. The species is probably *longiremus* Sars.

Alona quadrangularis: *Alona costata*: There is some question as to the identification of these two species. Only a single individual of each was found. The specimen that may be *Alona costata* is not strongly striated but other characteristics agree with descriptions of this species.

Graptoleberis testudinaria var. *inermis*: Although taken at three different places this species was rare. A few individuals

were found in Rat Creek, one in the collection from the Assiniboine River, and one individual and a few shells from a prairie slough.

Dunhevedia setiger: This species is apparently rare during the season of the year the collections were taken, as only a few specimens were found. They were taken from a prairie slough. Birge, in his "List of Crustacea Cladocera from Madison, Wisconsin," mentions the fact of *D. setiger* being one of the rarest of Cladocera in that region, but that in the month of August he found them in immense numbers, both males and females.

Pleuroxus sp.?: The shell is long and low, in some specimens evenly arched from the posterior dorsal angle to a point a little in front of the brood chamber from which the curve is flattened slightly to a distance including the basal third of the long sharp rostrum. In others the dorsal margin is evenly arched from the postero-dorsal angle to the rostrum. The head is small, high, with the long sharp curved rostrum far from the anterior margin of the shell, parallel with it and reaching nearly to a line with the ventral margin of the shell. The ventral margin is straight for two-thirds of its length from the anterior margin; the remaining third curves gently upward and has a single small tooth pointing backward, a little in front of the sharp curve into the posterior margin. The ventral margin has long pectinated setæ becoming shorter toward the posterior end of the shell. The anterior margin has setæ for a short distance from the ventral margin. A blunt posteriorly directed projection is formed by the postero-dorsal angle of the shell.

The post abdomen is long, slender, truncate, tapering toward the end. The posterior edge is slightly concave and is armed with about 18 to 20 or more small spines. The spines at the distal end of the series are much the longer and stronger. Anal claws are pectinated, long, and slightly curved. The second basal spine is longer than the first.

The eye is of moderate size. Pigment fleck is about one-half as large as the eye and is situated one-fourth the distance from the eye to the end of the rostrum. The antennules are cylindrical with setæ at the end and a lateral seta. Length of

antennule about equals the distance between the eye and the pigment fleck. Antennæ are short, small, with long setæ.

The specimens do not agree in all respects with the description given by Birge of *Pleuroxus gracilis* var. *unidens*, but do agree in many points. The largest specimen found measures .60 mm. in length by .38 mm. in height; another measures .60 mm. long and .33 mm. high. Birge gives a measurement of .85 mm. by .46 mm. and states that the species is the largest yet seen. The original description of *P. gracilis* var. *unidens* states that, "the striation is very plainly marked. The specimens found by the author are only very faintly striated and that most distinctly at the anterior part of the shell where the lines of striation are approximately parallel to the anterior margin. The larger part of the surface is free from markings, either striation or reticulation as far as could be observed. The shell is more arched dorsally than *P. gracilis* is figured by Matile. Birge's description of *P. gracilis* var. *unidens* says: "The upper posterior angle is prolonged into a projection, quite characteristic, seen, I believe, in no other species."

In the specimens found there is a slight projection, at the angle but not so pronounced as figured by Birge and by Herrick. The lower posterior corner is rounded and has a small tooth anterior to it as in *P. gracilis* var. *unidens*.

It seems improbable that the differences between the specimens, and the description and drawings of *P. gracilis* var. *unidens* should fall within the range of variation of a variety. The males were not seen. Collected in small numbers in June, 1895 from a shallow slough and a small creek.

Pleuroxus excisus: Only one or two individuals were observed. These were taken from Rat Creek, a sluggish stream flowing into Lake Manitoba.

Alonopsis latissima var. *media*: The specimens resemble the species described by Birge but have some points of difference.

Birge's description is as follows: "Rostrum prolonged, and shell sharp, somewhat quadrangular in shape, marked by striæ. The dorsal margin is convex, the hinder margin nearly straight. Its lower angle is rounded and is without teeth. The lower margin is concave and has long plumose setæ. The front margin is strongly convex. The postabdomen is long

and slender, resembling that of *Camptocercus*, and is notched at the distal extremity; it has two rows of fine teeth and some fine scales above them. The terminal claws are long, slender, with a basal spine in the middle, and are serrated. The antennules are long and slender, but do not reach to the end of the rostrum. They have each a flagellum and sense hairs. The antennæ are small and have eight ($\frac{300}{311}$) setæ and two ($\frac{100}{108}$) spines. The labrum resembles that of *A. leucocephalus*, but is slightly prolonged at the apex. The intestine, cæcum, and color resemble those of *Acroperus*. There is a trace of a keel present on the back."

Herrick's statement, in part, is as follows: "The specimens seen in Minnesota resemble this species, (*A. latissima* var. *media*) very nearly, apparently, but there are some differences. The terminal claw has an increasing series of spines to the middle; there seems to be no lateral row of scales beside the anal teeth; the abdomen is rather broad at the base and narrows toward the end. The shell is not square behind. The lower margin has a few long hairs anteriorly which are followed by a series of teeth, and in the concave part a somewhat longer set to a point just before the lower curved angle."

In most respects the Manitoba specimens agree more nearly with Herrick's description than with Birge's. A few points of difference are noted. In the Manitoba specimens a few long hairs are present on the lower margin anteriorly, then at a little distance posteriorly from the hairs are short sharp bristles, hardly heavy enough to be called teeth, becoming largest on the concave part of the margin. In one specimen the end of the abdomen is deeply cleft, the posterior lobe bearing four very strong teeth of nearly equal size.

Herrick says that hexagonal reticulations are seen upon the shell of the embryo yet in the brood sac. In several sexually mature females observed faint reticulations are present, more distinctly seen near the ventral margin.

Polyphemus pediculus: This species was found to be quite common in the Portage Plains region. It has not been reported from Iowa, and Birge says it is not common in southern Wisconsin. Although reported from Georgia it seems to be more commonly found in the north.